SX5A2-PELS-04

Three Phase Smart Street Light Meter
Product Manual

ملكية الشركه القابضه لكهرباء مصر

Frg/kWh   Imp/kvarh   Alarm

AOI SX5A2-PELS-04
3 Phase · 4 wire
Electronic Energy Meter

10×100A 3×240V/415V 50Hz
1600 imp/kWh   EN 50470-1/3
1600 imp/kvarh   IEC 62053-23
Class 1

dlms   Y   □

Street light controller
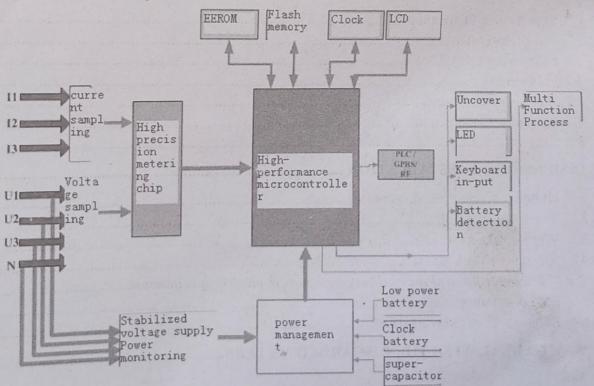Y2015

AOI ELECTRONICS FACTORY

CONTENTS

1.　　General Introduction

SX5A2-PELS-04 Three-phase Smart meter utilizing large scale integrated circuit, digital sampling-processing technology and SMT technology, the design and manufacture are based on industrial user actual power consumption status.

The performance index of meter is according to IEC62052-11，IEC52053-21/22. Follow IEC62056-21/46/47/53/61/62, could measure the active and reactive power & power demand in different direction, measuring active, reactive power, with RS485 and optical communication, M - BUS, buttons, PLC, and other functions, stable performance, high accuracy and convenient operation.

1.1　　Operating principle

This meter is composed of measurement unit and data processing unit and others ,in addition to measure active(reactive) power ,also could measure time sharing, measuring demand etc. And display, storage and output data .

SX5A2-SELS-04-02 Functional block diagram

1.2   Basic parameter

Item	Technical Requirements
Reference voltage Un	3*240V/415VAC
Operating voltage range	70%Un~120%Un
Frequency	50Hz
Specific current Ib	10A
Rated current Imax	100A
Breakaway starting current	4‰Ib
Accuracy class	Active 1.0 Reactive 2.0
Pulse constant	Active：1600imp/kWh Reactive：1600imp/kvarh
Operating temperature	Prescribed working temperature：-10℃~+60℃ Limit working temperature：-15℃~+70℃
Relative humidity	≤95%
Voltage circuit loss	≤1.5W, 10VA
Current circuit loss	≤1VA
Level of protection	IP54
Static	Contact discharge 8kV Air discharge 15kV
Group pulse	4kV
Surge	4.4kV
Electromagnetic field of high frequency	No-load 30V/m Load 10V/m
Insulation	4kV，1m
Impulse voltage	6kV
MTTF	≥10 years
Approximate weight	2.5kg
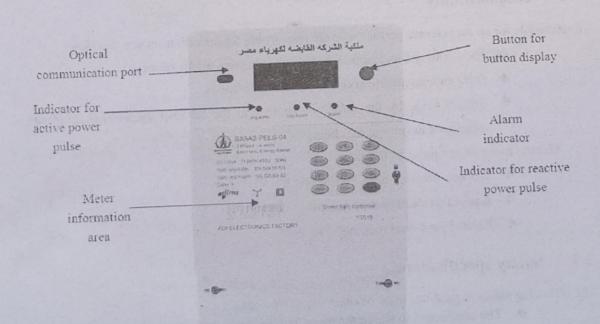
1.3   Reference standard

Standard number	Title
IEC62052-11	Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 11: Metering equipment
IEC62053-21	Electricity metering equipment (a.c.) –Particular requirements –Part21:Static meters for active energy(classes 1 and 2)
IEC62053-23	Electricity metering equipment (a.c.) – Particular requirements –Part 23: Static meters for reactive energy (classes 2 and 3)
IEC62053-31	Electricity metering equipment (a.c.) –Particular requirements –Part31:Pulse output devices for electromechanical and electronic meters
IEC62056-21	Electricity metering – Data exchange for meter reading, tariff and load control – Part 21:Direct local data exchange
IEC62056-42	Electricity metering – Data exchange for meter reading, tariff and load control – Part 42:Physical layer services and procedures for connection-oriented asynchronous data exchange
IEC62056-46	Electricity metering – Data exchange for meter reading, tariff and load control – Part 46: Data link layer using HDLC protocol
IEC62056-47	Electricity metering – Data exchange for meter reading, tariff and load control – Part 47:COSEM transport layer for IP networks
IEC62056-53	Electricity metering – Data exchange for meter reading, tariff and load control – Part 53:COSEM Application layer

IEC62056-61	Electricity metering – Data exchange for meter reading, tariff and load control – Part 61:OBIS Object identification system
IEC62056-62	Electricity metering – Data exchange for meter reading, tariff and load control – Part 62:Interface classes
DISSCAAA9	PARTICULAR REQUIREMENTS FOR PREPAYMENT METERS
ISO 9001	Quality Management standard
IS0 14000	Environmental management standard

1.4   Overall appearance

SX5A2-PELS-04 Three Phase Smart Street Light Meter

2. Safety

2.1 Safety information

The danger level and fault probability will be indicated by below warning mark.

⚠ WARNING	Warning :Serious personal injury or death
⚠ CAUTION	Warning : May occur personal injury or property damage
☞ NOTE	Warning : Products may be damaged in the work environment, or details described and other useful information to remind.

In addition to dangerous levels, also describes the danger types and sources, possible consequences, the measures of dealing with dangerous in the safety information.

2.2 Responsibility

Responsible for all the relevant persons who are responsible for operation, ensure that they:

- Have read and understood the relevant chapters in this manual;
- Have enough qualifications to perform operations;
- Strictly abide by the safety standards and the relevant operational information mentioned in subsequent chapters;

Electric meter owner liable as follows:

- Workers protection;
- Equipment damage prevention;
- Related personnel training;

2.3 Safety specification

The following safety regulations must be observed at all times:

- The conductors to which the meter will be connected must not be under voltage during installation or change of the meter. Contact with live parts is dangerous to life. The relevant preliminary fuses should therefore be removed and kept in a safe place until the work is completed, so that other persons cannot replace them unnoticed.

- Local safety regulations must be observed. Installation of the meters must be performed exclusively by technically qualified and suitably trained personnel.
- The meter must be held securely during installation. They can cause injuries if dropped.
- Meters which have fallen must not be installed, even if no damage is apparent. They must be returned for testing to the service and repair department responsible (or the manufacturer). Internal damage can result in functional disorders or short-circuits.
- The meter must on no account be cleaned with running water or with high pressure devices. Water penetrating can cause short-circuits.

3. Meter Introduction

3.1 Function & Performance

Item	Sub Item	Parameter
Basic Parameters	Meter type	3P4W DC
	Accuracy of active energy	Class 1 (IEC 62053-21)
	Accuracy of reactive energy	Class 2 (IEC 62053-23)
	Rated voltage	3P4W DC: 3x 240/415 V Specified operation range: 0.8 to 1.15 U_n Limit range of operation: 0.7 to 1.2 U_n
	Rated frequency	50Hz（± 5%）
	Current	Direct type: 10(100)A
	Starting current	0.004Ib (Direct type)
	LED pulse constant	1600imp/kWh，1600imp/kvarh
	Power consumption	Current line: Active<0.5VA； Voltage line：Active<1.5W，Apparent <8VA；
	Operation temperature	-10°C ~ +70°C
	storage temperature	-30°C ~ +70°C
	Humidity	5%~95%RH
	IP grade	IP54

Basic test type	Basic test	IEC 62053-21 IEC 62053-23 IEC 62052-11
Communication	Communication port	Optical: 300bps GPRS
	Communication protocol	Optical: IEC62056-21 E mode GPRS: DLMS TCP/IP RS485: HDLC
Measurement	Active energy calculation	Forward active energy = Q1+Q4 Reverse active energy = Q2+Q3 Total active energy = Q1+Q2+Q3+Q4 Apparent energy is the same.
	Reactive energy calculation	Forward reactive energy = Q1+Q2 Reverse reactive energy = Q3+Q4 (Q1:reactive energy of Quadrant I Q2:reactive energy of Quadrant II Q3:reactive energy of Quadrant III Q4:reactive energy of Quadrant IV)
	Energy register	Total active energy & each tariff Total forward active energy & each tariff Total reverse active energy & each tariff Total forward reactive energy & each tariff Total reverse reactive energy & each tariff Total reactive energy of Q1 & each tariff Total reactive energy of Q2 & each tariff Total reactive energy of Q3 & each tariff Total reactive energy of Q4 & each tariff Total forward apparent energy & each tariff Total reverse apparent energy & each tariff L.1/L.2/L.3 total forward active energy L.1/L.2/L.3 total reverse active energy

		L1/L2/L3 total forward reactive energy
		L1/L2/L3 total reverse reactive energy
		L1/L2/L3 total apparent energy of Q1
		L1/L2/L3 total apparent energy of Q2
		L1/L2/L3 total apparent energy of Q3
		L1/L2/L3 total apparent energy of Q4
		L1/L2/L3 total forward apparent energy
		L1/L2/L3 total reverse apparent energy
	Instantaneous value	Voltage（A/B/C）
		Current（Total/A/B/C）
		Power factor（Total/ A/B/C）
		Total active power
		Forward active power （Total/A/B/C）
		Reverse active power （Total/A/B/C）
		Forward reactive power （Total/A/B/C）
		Reverse reactive power （Total/A/B/C）
		Forward apparent power （Total/A/B/C）
		Reverse apparent power （Total/A/B/C）
		Phase angle of voltage & current(A/B/C)
		Phase angle of voltage （L1L2/L1L3/L2L3）
		Frequency
LED & LCD	LED	Active pulse output, reactive pulse output,alarm indicator
	LCD	Energy display mode: configurable
	Display mode	Normal
		Keypress
		Power down
	Display time	Normal display time: 1~60s configurable
		Keypress display time: 60s no press turn to normal display
		Power down display: no display without pressing key, display off after 10s from activate by keypress
TOU & RTC	Period tariff	-4 tariffs
		-12 period
		-8 day tables

		-12 season tables
		-8 week tables
		-100 public holidays
	RTC	≤0.5s/day (in 23°C)
	Calendar	Gregorian calendar, leap year switches automatically Format: yYYMMDD / yhhmmss (y=1, DST; y=0, standard time)
	Timezone	(GMT+01:00) Central European Time
	Battery life	10 years, can continuous work 2 years when meter power off. RTC battery inside.
Demand	Metering method	Period & Sliding Demand period is: 1, 15, 30 or 60 minutes Sliding: configurable, default 15min, number of sliding window is 1.
	Display format	2+2
	Demand & Maximum Demand	Total forward active demand & occurrence time and each tariff Total reverse active demand & occurrence time and each tariff Total forward reactive demand & occurrence time and each tariff Total reverse reactive demand & occurrence time and each tariff Total demand & occurrence time of Q1 and each tariff Total demand & occurrence time of Q2 and each tariff Total demand & occurrence time of Q3 and each tariff Total demand & occurrence time of Q4 and each tariff Total forward apparent demand & occurrence time and each tariff Total reverse apparent demand & occurrence time and each tariff

	Accumulative MD	Total forward active demand & occurrence time and each tariff
		Total reverse active demand & occurrence time and each tariff
		Total forward reactive demand & occurrence time and each tariff
		Total reverse reactive demand & occurrence time and each tariff
		Total demand & occurrence time of Q1 and each tariff
		Total demand & occurrence time of Q2 and each tariff
		Total demand & occurrence time of Q3 and each tariff
		Total demand & occurrence time of Q4 and each tariff
		Total forward apparent demand & occurrence time and each tariff
		Total reverse apparent demand & occurrence time and each tariff
	Record content of last demand period	Total forward active demand & occurrence time
		Total reverse active demand & occurrence time
		Total forward reactive demand & occurrence time
		Total reverse reactive demand & occurrence time
		Total demand & occurrence time of Q1
		Total demand & occurrence time of Q2
		Total demand & occurrence time of Q3
		Total demand & occurrence time of Q4
		Total forward apparent demand & occurrence time
		Total reverse apparent demand & occurrence time
Load record	Load profile 1	Maximum supports 35 capture objects, can store 3 days data when load period is 15min
		Capture objects: configurable
		Total forward active energy
		Total reverse active energy
		Total forward reactive energy
		Total reverse reactive energy
		Total forward apparent energy

		Total reverse apparent energy
		Forward active demand
		Reverse active demand
		Forward reactive demand
		Reverse reactive demand
	Load profile 2 (Daily Freeze)	Maximum supports 50 capture objects, can store 19 days data at least.
		Capture objects: configurable
		L1/L2/L3 phase voltage
		L1/L2/L3 phase current
		Total active power
		L1/L2/L3 phase active power
		Total reactive power
		L1/L2/L3 phase reactive power
		Power factor
		Frequency
	Load profile 3	Maximum supports 35 capture objects, can store 3 days data when load period is 15min
		Capture objects: configurable
	Load profile 4	Maximum supports 35 capture objects, can store 3 days data when load period is 15min
		Capture objects: configurable
Billing	Billing method	Billing starting time: 15min(for command billing and keypress billing)
		Keypress billing: press the programmable button and hold 5s can clear current MD and do the billing manually.
		Monthly billing: meter can do the billing automatically in the billing day
		• Every day at 00:00 (midnight).
		• Every month on [1st day] , [day Y] , [day Z] at 00:00 (midnight)
		• Every year in [month] , [day] at 00:00 (midnight)
		• Billing period can also by closed locally remotely through SW

		• Closure of the period locally by using a button on the meter **Command billing:** do the billing via PC software or remote command.
	Billing data (Energy)	Refer to customer requirement. Billing date configurable, record last 14 billing data, billing contents as following: Total forward active energy and each tariff Total forward/reverse active MD & occurrence time and each tariff Total forward/reverse active accumulative MD & occurrence time and each tariff
	Billing data (Active MD)	Billing time configurable, can store the last 14 billing data, billing content as following: Billing time Total forward/reverse active MD & occurrence time Total forward/reverse active MD & occurrence time of tariff 1 Total forward/reverse active MD & occurrence time of tariff 2 Total forward/reverse active MD & occurrence time of tariff 3 Total forward/reverse active MD & occurrence time of tariff 4
Event	Standard event	Maximum recording last 100 events: Power on Power off Time synchronization Clock illegal Change battery Error register reset Alarm register reset TOU activation Firmware upgrade preparation

		Firmware upgrade successful
		Passive tariff table configuration
		Programming event
		Firmware verification failed
		Reverse phase sequence event
		Reley 1 diconnect
		Reley 2 diconnect
		Load data reset event
		Event log reset event
	Fraud event	Maximum recording last 50 events:
		Terminal cover event
		Meter cover event
		Password wrong event
		Total power reverse event
		L1/L2/L3 reverse event
		Module cover event
		Module insert/pull out event
		Event reset
	Relay event	Maximum recording last 50 events:
		Remote disconnection
		Remote connection
		Local disconnection
		Local Reconnection
		Disconnect manually
		Connect manually
	Power grid event	Maximum support recording last 100 events:
		Overvoltage
		undervoltage
		Loss of phase
		Voltage recovery
		Long power down
		Voltage imbalance
		Current imbalance
		Low power factor

Structure		
		Event reset
	Terminal cover	DIN standard
	IP grade	Indoor IP54
	Seal	Seal screw
	Meter material	Meter cover: PC Terminal : 90% PC+10% glass fiber
	Dimensions(LxWxH)	293mm*170mm*78mm

3.2   Function Overview

3.2.1   Metering

1) Metering method:

Forward active energy=Q1+Q4

Reverse active energy=Q2+Q3

Total active energy= Q1+Q2+Q3+Q4

Forward reactive energy=Q1+Q2

Reverse reactive energy=Q3+Q4

(Q1:reactive energy of Quadrant I; Q2:reactive energy of Quadrant II; Q3:reactive energy of Quadrant III; Q4:reactive energy of Quadrant IV)

Apparent energy metering method is the same with active energy.

2) Metering accuracy:

Electricity meter metering accuracy for active energy----------Class 1

Electricity meter metering accuracy for reactive energy--------Class 2

3) Instantaneous value

■ Voltage （A/B/C）

■ Current （Total/A/B/C）

■ Power factor （Total/ A/B/C）

■ Total active power

■ Forward active power   （Total/A/B/C）

■ Reverse active power   （Total/A/B/C）

■ Forward reactive power   （Total/A/B/C）

■ Reverse reactive power   （Total/A/B/C）

- Forward apparent power （Total/A/B/C）
- Reverse apparent power （Total/A/B/C）
- Frequency
- Phase Angle (/A/B/C)
- Phase Angle (Uab /Uac/Ubc)

4) Incremental quantity

Load profile 1 Incremental quantity

Load profile 2 Incremental quantity

5) Average instantaneous value

Voltage

Current

Frequency

3.2.2 Demand

1) Metering method:
   - Period: demand period configurable, 1min, 15min, 30min, 60min;
   - Sliding: number of sliding window≠1

2) MD reset
   - Keypress billing: press the programmable button and hold 5s can clear current MD and do the billing manually, keypress billing and command billing are not allowed when shutting N minutes.
   - Command billing: send the billing command via PC software to reset the current MD, keypress billing and command billing are not allowed when shutting N minutes.
   - Monthly billing: automatically billing at the billing time every month, current MD will reset after monthly billing, current MD will add into the Accumulative MD.

3) MD record content:
   - Total forward active demand & occurrence time and each tariff
   - Total reverse active demand & occurrence time and each tariff
   - Total forward reactive demand & occurrence time and each tariff
   - Total reverse reactive demand & occurrence time and each tariff
   - Total demand & occurrence time of Q1 and each tariff
   - Total demand & occurrence time of Q2 and each tariff
   - Total demand & occurrence time of Q3 and each tariff
   - Total demand & occurrence time of Q4 and each tariff

- ■ Total forward apparent demand & occurrence time and each tariff
- ■ Total reverse apparent demand & occurrence time and each tariff

4) Record content of last demand period:

- ■ Total forward active demand & occurrence time and each tariff
- ■ Total reverse active demand & occurrence time and each tariff
- ■ Total forward reactive demand & occurrence time and each tariff
- ■ Total reverse reactive demand & occurrence time and each tariff
- ■ Total demand & occurrence time of Q1 and each tariff
- ■ Total demand & occurrence time of Q2 and each tariff
- ■ Total demand & occurrence time of Q3 and each tariff
- ■ Total demand & occurrence time of Q4 and each tariff
- ■ Total forward apparent demand & occurrence time and each tariff
- ■ Total reverse apparent demand & occurrence time and each tariff

5) Record content of accumulative MD:

- ■ Total forward active demand & occurrence time and each tariff
- ■ Total reverse active demand & occurrence time and each tariff
- ■ Total forward reactive demand & occurrence time and each tariff
- ■ Total reverse reactive demand & occurrence time and each tariff
- ■ Total demand & occurrence time of Q1 and each tariff
- ■ Total demand & occurrence time of Q2 and each tariff
- ■ Total demand & occurrence time of Q3 and each tariff
- ■ Total demand & occurrence time of Q4 and each tariff
- ■ Total forward apparent demand & occurrence time and each tariff
- ■ Total reverse apparent demand & occurrence time and each tariff

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NOTE   when the meter do the billing, the md of current total forward active energy and each tariff will add into the accumulative MD.

3.2.3 Relay module

3.2.3.1 Sunrise/sunset disconnect/connect

Meter will calculate the time of sunrise and sunset automatically according to longitude, latitude, time zone and current date. When sunrise time is up, relays disconnect at the same time; when the sunset time is up, relays connect at the same time.

Sunrise and sunset time parameters list:

No.	Data Item	Data Format	OBIS
1	Longitude	XXX.XXXX°	3, 0.0.96.50.40.255
2	Latitude	XXX.XXXX°	3, 0.0.96.50.41.255
3	Time zone	XXXX min	8, 0.0.1.0.0.255,

3.2.3.2 Periodically disconnect/connect

Meter can do the relay execution according to the preset period, and the relay of each phase can do the different action. You can set 4 periods at most each day, you only need to set FF into the time parameters when you want to turn off the function of periodically disconnect/connect.

Periodical parameters list

No.	Data Item	Data Format	OBIS
1	1st street light control period	HH:mm:LL	1, 0.0.75.60.18.255
2	2nd street light control period	HH:mm:LL	1, 0.0.75.60.19.255
3	3rd street light control period	HH:mm:LL	1, 0.0.75.60.20.255
4	4th street light control period	HH:mm:LL	1, 0.0.75.60.21.255

3.2.3.3 Keyboard short code disconnect/connect

Keyboard short code was designed to do the relay execution by meter keyboard for easy maintenance. After executing disconnection by short code, you have to connect the relay by using the short code or communication command.

Short code list:

Short code				Operation	Remark
9	5	2	7	Three phases disconnect at the same time	
9	5	2	1	Phase A disconnect	
9	5	2	2	Phase B disconnect	
9	5	2	3	Phase C disconnect	
7	3	4	8	Three phases connect at the same time	
7	3	4	1	Phase A connect	
7	3	4	2	Phase B connect	
7	3	4	3	Phase C connect	
8	2	6	9	Overload disconnect recovery	Relay will do the action according to the sunrise/sunset time after short code command.
7	1	9	8	Disconnect event of open cover reset	Relay will do the action according to the sunrise/sunset time after short code command.

3.2.3.4 Communication command disconnect/connect

Execute relay action through the communication port. After disconnection, you have to use keyboard short code or communication command to connect the relay.
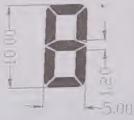
3.2.3.5 Event disconnect/connect

- Battery under voltage disconnect. When the battery voltage<0.8Vref, relay disconnect. After changing a new battery, can connect the relay by short code, communication command or sunrise/sunset function.
- Current overload disconnect. When one phase current keep overload than preset threshold value, relay disconnect. Can connect the relay by short code, communication command or sunrise/sunset function.
- Open meter cover, terminal cover or module cover disconnect. When the meter detects such fraud event is happening, relay will disconnect. After the events, can connect relay by using the short code of reset open cover fraud event.
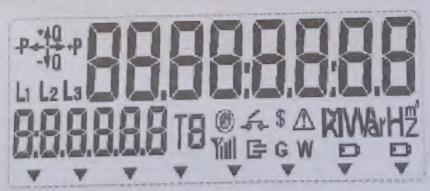
3.2.4 Display module

3.2.4.1 Physical character

- LCD visible size: 68mm×28mm; figure size: 5.00mm×10.00mm.

- LCD material is TN type, operating temperature range is -25℃～+80℃
- High-contrast ratio
- Large view angle
- LCD polaroid is anti-ultraviolet

3.2.4.2 LCD full screen

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LCD display information	Description
88.88:8.8:8.8	Data display area
8.8.8.8.8.8	OBIS display area
T8	Tariff display area
KWarHz㎥	Unit display area
Yıll	GPRS signal
⬅	In communication
L1 L2 L3	Phase indicator (flashing when reverse phase sequence happened)
-P ← ↑+Q ↓-Q → +P	+P: forward active -P: reverse active +Q: forward reactive -Q: reverse reactive
🔋 🔋	Left: internal battery under voltage Right: external battery under voltage
⌁	Relay disconnect/connect Notes: Only when all the relays are disconnected, it shows disconnect; All the relays are connected, it shows connect. If three relays are in different status, please refer to inverted triangle.

⚠	Alarm (battery, open meter cover, open terminal cover)
$	Charge
ⓖ	Fraud event happened (open meter cover, open terminal cover)
G	Gas meter installed
W	Water meter installed
▼ (S1~S8)	Status indicator

▼	▼	▼	▼	▼	▼	▼	▼
L1 relay dis-connect	L2 relay dis-connect	L3 relay dis-connect	Executing keyboard dis-connect	Executing communi-cation command dis-connect	Open meter cover event happen-ed	Current overload happened	Program-ming status /factory mode (flashing)

3.2.4.4 Display mode

● Automatic scrolling display

Default display mode is automatic scrolling display, scrolling display time (default 5s), items for automatic scrolling display table (up to 100 items) is configurable.

Automatic scrolling display item list:

Display item	OBIS	Data format
Accumulative total active energy	15.8.0	XXXXXXXX
Time	0.9.1	XX:XX:XX
Date	0.9.2	XXXXXX
Current sunrise time	C.50.42	XXXXXXXX
Current sunset time	C.50.43	XXXXXXXX
Meter ID	C.1.0	XXXXXXXX XXXX

- Button display

Meter will go into button display mode when press the button. There is only button display when meter power off, display items are the same with power on. Meter will exit the button display if no operation in 10s. Items for button display table (up to 100 items) is configurable.

Button display item list:

Display item	OBIS	Data format
Accumulative total active energy	15.8.0	XXXXXXXX
Time	0.9.1	XX:XX:XX
Date	0.9.2	XXXXXX
Current sunrise time	C.50.42	XXXXXXXX
Current sunset time	C.50.43	XXXXXXXX
Meter ID	C.1.0	XXXXXXXX XXXX
Forward active MD	1.8.0	XX.XX kW XX-XX-XX --XX:XX:XX
Reverse active MD	1.8.2	XX.XX kW XX-XX-XX --XX:XX:XX
Total forward active energy	1.8.0	XXXXXXXX
Total reverse active energy	2.8.0	XXXXXXXX
Voltage of phase A	32.7.0	XXX.XX
Voltage of phase B	52.7.0	XXX.XX
Voltage of phase C	72.7.0	XXX.XX
Current of phase A	31.7.0	XXX.XX
Current of phase B	51.7.0	XXX.XX
Current of phase C	71.7.0	XXX.XX

3.2.5 Event

When the event is happening, single channel reset event, so this event won't be judged again; if reset all the events, meter will judge the event again.

3.2.5.1 Standard event

Up to 100 event records.

No.	Event name	Description
1	Power down start	battery power supply mode
2	Power down end	Meter exit battery power supply mode, and enter normal operation mode.
3	DST start/end	DST switch (enter/exit)
4	Time synchronization (old)	Every execution will generate one clock adjusted (old date/time)
5	Time synchronization (new)	Every execution will generate one clock adjusted (old date/time) Note: Time change from DST switch won't record
7	Change battery	External clock battery voltage under threshold value, record event. Note: Change battery event only for external battery.
9	Activation of passive tariff table	Switching between main tariff table and passive tariff table will record this event
10	Error register reset	Set ERR register=0, record event
11	Alarm register reset	Set alarm register=0, record event
17	Firmware upgrade preparation	After data transfer and verify successfully of remote upgrade, record event
18	Firmware upgrade successful	Firmware upgrade successful, record event.
19	Passive tariff table configuration	Generate 4 couples time records of passive TOU programmed/one or more parameters changed.
20	Programming event	Parameters setting successful, record event.
23	Firmware upgrade failed	Firmware upgrade failed, record the time.
24	Reverse phase sequence	1. Meter current phase sequence abnormal time more than 3s(ACB,CAB, etc.), and minimum current > 0.2% rated current, record event. 2. Meter voltage phase sequence abnormal time more than 3s(ACB,CAB, etc.), record event
26	Reverse phase sequence end	1. Meter voltage phase sequence turn to normal. 2. Current phase sequence turn to normal, or minimum current< 1% rated current. 1 and 2 happened at the same time, 3s later, record event.
27	Tariff switch	Every tariff switch will record one event, if relay status changed during tariff switch, record relay event accordingly.
28	Season table change event	Season table switch, record event. Note: Season table change to holiday table or holiday table change to season table won't generate this event.
29	Relay connect	Relay connect
30	Relay disconnect	Relay disconnect
33	Load profile reset event	Send reset load profile command and reset successful, record event

3.2.5.2 Fraud event

Up to 50 event records.

No.	Event name	Description
1	Open terminal cover	Meter terminal cover was removed more than 1s, record event. Note: when meter power on, detect this event every 3s; when power off, detect every 60s.
2	Close terminal cover	Meter terminal cover was closed more than 1s, record event.
5	Open meter cover	Open meter cover more than 1s, record event.
6	Close meter cover	Close meter cover more than 1s, record event.
9	Total power reverse	Total power is a negative value more than 30s, record event.
11	L1 current reverse	L1 current reverse and more than 30s, record event.
12	L2 current reverse	L2current reverse and more than 30s, record event.
13	L3 current reverse	L3 current reverse and more than 30s, record event.
14	Total power reverse end	Total power is a positive value more than 30s, record event.
15	L1 current reverse end	L1 current forward and more than 30s, record event.
16	L2 current reverse end	L2 current forward and more than 30s, record event.
17	L3 current reverse end	L3 current forward and more than 30s, record event.
18	Open module cover	Open module cover more than 1s, record event.
19	Close module cover	Close module cover more than 1s, record event.
22	Insert module	Insert module more than 3s, record event.
23	Pull out module	Pull out module more than 3s, record event.

3.2.5.3 Relay event

Up to 50 event records.

No.	Event name	Description
1	Connect manually	Manually connect the relay and relay status changed, record event.
2	Remote disconnect	Remotely disconnect relay by communication command, and relay status changed, record event.
3	Remote connect	Remotely connect relay by communication command, and relay status changed, record event.
4	Disconnect locally	Relay disconnect locally (overload), relay status changed automatically, record event.
5	Over threshold (current)	Current over threshold (default 0XFFFFFFFF) more than 60s, record event. Note: judged by total current of three phases
6	Over threshold end (current recovery)	Current under threshold (default 0XFFFFFFFF) more than 60s, record event.
7	Threshold change	Threshold change (current), record event.
8	Connect locally	Meter recovery from abnormal status and connect relay automatically, record event.
9	Event record reset	Control event reset

3.2.5.4 Power grid event

Up to 1000 event records.

No.	Event name	Description
1	L1 undervoltage	L1 voltage<90%Un more than 30s, record event. Threshold value and time are configurable.
2	L2 undervoltage	L2 voltage<90%Un more than 30s, record event. Threshold value and time are configurable.
3	L3 undervoltage	L3 voltage<90%Un more than 30s, record event. Threshold value and time are configurable.
4	L1 overvoltage	L1 voltage>110%Un more than 30s, record event. Threshold value and time are configurable.
5	L2 overvoltage	L2 voltage>110%Un more than 30s, record event. Threshold value and time are configurable.
6	L3 overvoltage	L3 voltage>110%Un more than 30s, record event. Threshold value and time are configurable.
7	L1 lose of phase	L1 voltage<60%Un more than 30s, record event. Threshold value and time are configurable.
8	L2 lose of phase	L2 voltage<60%Un more than 30s, record event. Threshold value and time are configurable.
9	L3 lose of phase	L3 voltage<60%Un more than 30s, record event. Threshold value and time are configurable.
10	L1 lose of phase end	L1 voltage>60%Un more than 30s, record event. Threshold value and time are configurable.
11	L2 lose of phase end	L2 voltage>60%Un more than 30s, record event. Threshold value and time are configurable.
12	L3 lose of phase end	L3 voltage>60%Un more than 30s, record event. Threshold value and time are configurable.
13	Long power down	Meter power off more than 180s, record event.
14	L1 undervoltage end	L1 voltage>90%Un more than 30s, record event. Threshold value and time are configurable.
15	L2 undervoltage end	L2 voltage>90%Un more than 30s, record event. Threshold value and time are configurable.
16	L3 undervoltage end	L3 voltage>90%Un more than 30s, record event. Threshold value and time are configurable.
17	L1 overvoltage end	L1 voltage≤110%Un more than 30s, record event. Threshold value and time are configurable.
18	L2 overvoltage end	L1 voltage≤110%Un more than 30s, record event. Threshold value and time are configurable.
19	L3 overvoltage end	L1 voltage≤110%Un more than 30s, record event. Threshold value and time are configurable.
23	Voltage unbalance	Vmax>0.8 Un, and （Vmax-Vmin）/Vmax ≥ 50% more than 30s, record event. Note: Vmax=current maximum voltage of three phases; Vmin=current minimum voltage of three phases; Unbalance rate configurable.
24	Voltage unbalance end	Vmax≤0.8 Un, and （Vmax-Vmin）/Vmax < 50% more than 30s, record event. Note: Vmax=current maximum voltage of three phases; Vmin=current minimum voltage of three phases; Unbalance rate configurable.

25	Current unbalance	Imax>0.05b, and (Imax-Imin) /Imax ≥ 50% more than 30s, record event. Note: Imax=current maximum current of three phases; Imin=current minimum current of three phases; Unbalance rate configurable.
26	Current unbalance end	Imax≤0.05b, and (Imax-Imin) /Imax <50% more than 30s, record event. Note: Imax=current maximum current of three phases; Imin=current minimum current of three phases; Unbalance rate configurable.
34	Low power factor	Total power factor<low power factor threshold 0.9 more than 30s, record event. Threshold configurable.
35	Low power factor end	Total power factor≥low power factor threshold 0.9 more than 30s, record event. Threshold configurable.
37	L1 undervoltage 1 start	L1 voltage<undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
38	L2 undervoltage 1 start	L2 voltage<undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
39	L3 undervoltage 1 start	L3 voltage<undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
37	L1 undervoltage 1 end	L1 voltage≥undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
38	L2 undervoltage 1 end	L2 voltage≥undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
39	L3 undervoltage 1 end	L3 voltage≥undervoltage threshold (80%Un) more 30s, record event. Threshold and delay time configurable.
40	Event record reset	Event reset

3.2.5.5 Event parameters configuration

| Event	Delay time
Udervoltage threshold	Default 90%Un, 1~299V configurable
Udervoltage 2 threshold (< 0.8Un)	Default 80%Un, 1~299V configurable
Overvoltage threshold	Default 110%Un, 231~460V configurable
Undervoltage/overvoltage judging time	Default 30s, 1~60s configurable
Lose of phase threshold	Default 60%, 1~299V configurable
Lose of phase judging time	Default 30s, 1~60s configurable
Current unbalance rate	Default 50%, 0~1 configurable
Low power factor threshold	Default 0.9, 0~1 configurable
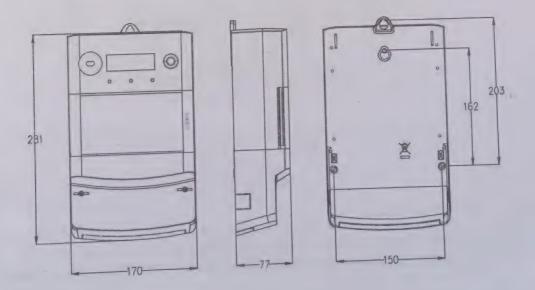
| Voltage unbalance rate	Default 50%, 0~1 configurable
Long power down threshold time	Fixed 180s, 0~65535 configurable.
Meter cover, terminal cover, magnetic interference detecting time	3s delay after power on Detect every 1min when power off, no delay.
Overload disconnect threshold	0~FFFFFFFF configurable
Overload disconnect detecting time	0~999999999 configurable
Overload automatically connect time	0~999999999 configurable

4. Dimensions & Installation
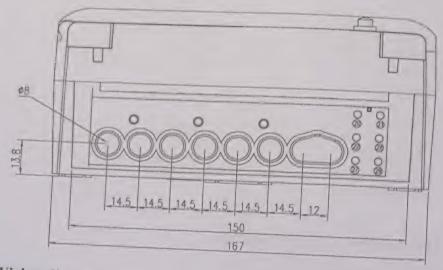
4.1 Overall dimensional drawing
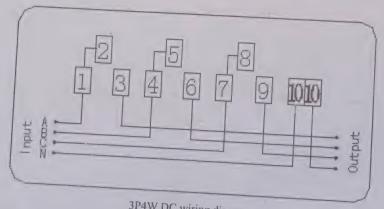
Length*Width*Height=281mm*170mm*77mm

4.2   Terminal box

4.3   Wiring diagram

3P4W DC wiring diagram

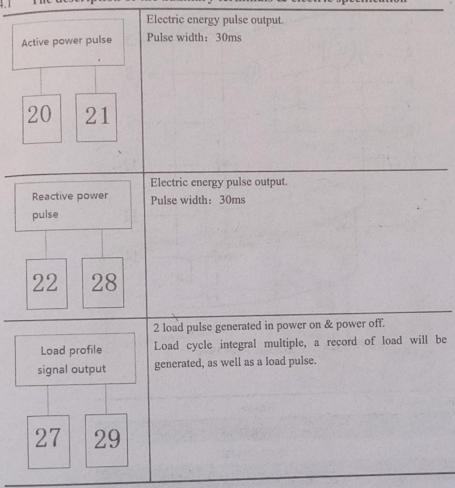## 4.4   Auxiliary terminal

The auxiliary terminals in this series are of wide range, including:

· Auxiliary relay port, 4 terminals occupied when connected with the interface, each auxiliary relay occupies 2 terminals;

· RS485 communication interface, 2 terminals occupied when connected with the interface.

> **NOTE**   1. This series products have 6 terminals in total, therefore it should not be over 6 terminals when selection is made.
>
> 2. The definition of the auxiliary terminals is not fixed, the corresponding details could be seen in the installation and maintenance manual of the products.

4.4.1 The description of the auxiliary terminals & electric specification

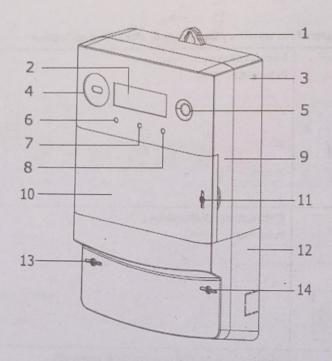|	
Active power pulse 20　21	Electric energy pulse output. Pulse width: 30ms
Reactive power pulse 22　28	Electric energy pulse output. Pulse width: 30ms
Load profile signal output 27　29	2 load pulse generated in power on & power off. Load cycle integral multiple, a record of load will be generated, as well as a load pulse.

4.5　Exploded view

Once the meters leave factory, they cannot be opened for they have been lead sealed by the factory, so the inner structure of the meter will not be described further here. The front cover is protected by a plastic lead seal, which could be opened to change the battery or remote communication module.

P34A2-02 Structure Front View

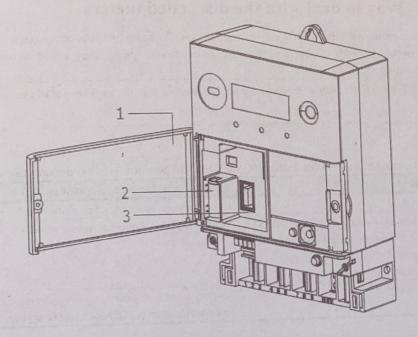| Number	Name
1	Hanging hook
2	Liquid crystal
3	Meter base
4	Optical port
5	Button (for button display)
6	Indicator for active power pulse
7	Indicator for reactive power pulse
8	Alarm indicator
9	Meter cover
10	Module cover
11	Seal of the module cover
12	Terminal cover
13、14	Seal of the terminal cover

NOTE   Notice:

- The front cover should be opened if the battery and remote communication module are to be visited.

   The battery and remote communication modules can be changed only if the front cover opened.

P34A2-02 Front View of the meter (module cover opened)

Number	Name
1	Module cover
2	Battery
3	Extension module

4.6   Storage & transportation

The appropriate temperature for meter storage: -25℃～+60℃,   humidity: <85%. The meters must be placed with their original package, and the stacking height should not beyond 5 layers. It is forbidden to make the meters get violently striked during transportation and storage.

5.   Way to deal with the discarded meters

According with ISO 14001 environmental qualification norm, the components and parts of the meters were designed to be separated, so after disassembling they could be provided to the corresponding recycle station.

> ☞ **NOTE**   Notice: the discard must be complied with the local laws of discard and environment protection.

The meter can be disassembled into different parts, the recommendation discard way as follows:

parts	the recommendation discard method
PCB	Electric waste: scrap according to the local laws
Metal parts, including the metal plate for the use of optical communication, terminal connection copper bar, internal current connecting line etc.	Supply to the metal material recycle station
Plastic parts	Supply to the plastics recycle station, if it is unrecyclable, then incineration could be applied.